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ABSTRACT

This study compared the effectiveness of traditional teaching, electronic mail (e-mail), and combination approaches for teaching graduate introductory statistics classes. The e-mail courses that are the focus of this study were offered in the fall terms of academic years, 1997 through 2000 by the same instructor. All sections incorporated the use of a computer for data analysis. There were 41 participants in the traditional classes, 20 in the electronic-only classes, and 28 using both methods. In all classes, the majority of students were white females. Twenty-item multiple-choice pre-tests and post-tests on basic statistical topics were given. An analysis of covariance (ANCOVA) was run using post-test scores as the response variable and pre-test scores as the covariate. The ANCOVA technique involves features of both the analysis of variance and regression, so assumptions for both were tested. Normality and homoscedasticity across all groups were verified. Homogeneity of regression was observed in scatter plots of pre-test scores versus post-test scores and their trend lines by treatment and control groups. The test indicated that the null hypothesis of no statistically significant difference among the traditional, electronic, and combined classes scores could not be rejected at the 0.05 level. The effect size (f=0.16) was small. The paper concludes that offering the course by any of these three approaches seemed neither to help nor hinder the performance of students to the extent measured by the multiple-choice tests. The course syllabus is attached. (Contains 29 references.) (SLD)

Graduate Introductory Statistics: In Class vs. On Line

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Twenty-ninth Annual Meeting

Double Tree Hotel

Little Rock, Arkansas

November 14, 2001

Abstract

The study compared the effectiveness of traditional, electronic mail, and combination approaches for teaching graduate introductory statistics classes. The electronic mail courses that are the focus of this study were offered in the 1997-2000 Fall terms under the same instructor. All sections incorporated the use of a computer program for data analysis. There were 41 participants in the traditional (only) classes, 20 in the electronic (only), and 28 using both methods, with a majority membership of white females. Twenty-item multiple-choice pretests and posttests on basic statistical topics were given. An analysis of covariance (ANCOVA) was run using posttest scores as the response variable and pretest scores as the covariate. The ANCOVA technique involves features of both the analysis of variance and regression, so assumptions for both were tested. Random selection was not possible since students were allowed to participate in any version of the course they thought most appropriate for them. Normality and homoscedasticity across all groups were verified using the Omnibus Normality of Residuals and Modified-Levene Equal-Variance tests. Homogeneity of regression was observed in scatterplots of pretest scores versus posttest scores and their trend lines, by treatment and control groups. The test indicated that the null hypothesis of no statistically significant difference among the traditional (adjusted mean of 6.17, n=41), electronic (adjusted mean of 6.83, n=20), and both traditional and electronic (adjusted mean of 6.94, n=28) classes' scores could not be rejected at the 0.05 level [$F(2,85)=1.15$, $p=0.32$]. The effect size, $f=0.16$, was small (Cohen). It is concluded, then, that offering the course using a traditional approach, electronic mail, or a combination of approaches, seemed to neither help nor hinder the performance of the students, to the extent measured by the multiple-choice tests.

Graduate Introductory Statistics: In Class vs. On Line

Not too many years ago, it was considered a novelty to teach classes on line, either through electronic mail or through the World Wide Web. This phenomenon is no longer the case. In fact, there are many examples of teaching along these lines. For example, Blake (2000) described a method for using electronic mail and the Web to teach an introductory course in media writing. He found that students were writing better at the end of the course than at the beginning, although he did note the limitations of subjectivity in grading and design flaws that a one-group pretest-posttest study can have. Stocks and Freddolino (2000) described the use of computer-mediated communication (CMC) in a graduate-level social work course. As with Blake's study, CMC comprises e-mail and the Web, as well as other hypertext environments. The authors noted the large time burden of answering individual students' questions, but said that automating part of the process reduced the load. In this case, Java scripts were used to provide answers to study questions. Little difference in performance from the first trial of the class using CMC to the next was noted, although the students did seem to enjoy the interaction of the second iteration of the course more than the initial trial, probably due to improvements made after the first run.

Other uses of teaching on line include a program of 30 courses at Embroidery University, "which are targeted to embroidery companies of all sizes and levels, include basic computer, compiling a financial plan, business tips and marketing (Embroidery University, 1999)." Another unusual application of internet teaching is the International Association of Assessing Officer's first Internet course, Site Analysis and Evaluation (Jackson, 1999).

Ellram and Easton (1999) presented a "case study in developing and conducting a purchasing class over the Internet." Although there were a number of suggestions

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Cheurprakobkit (2000), in analyzing Web-based criminology/criminal justice programs in Texas colleges and universities, found that

> overcoming distance and time barriers was perceived to be the most advantageous benefit of the web-based program, followed by the opportunities to individualize instruction, and make use of technology. For the disadvantages, lack of face-to-face student-teacher interaction was perceived to be the most disadvantageous, followed by the needed time for course preparation; high financial costs were considered to be the least disadvantageous.

Graham and McNeil (1999) implemented a course in social geography to show "how the Web can be used to deliver material to undergraduates in a novel, exciting and flexible manner." They found that student reaction was generally favorable, although some technical difficulties were "off-putting for some students-particularly the technophobes." Merritt (2001) described how the internet could be used to illustrate the principles of physics using video clips in a course taught by a colleague.

There have been a number of approaches presented in the literature recently suggesting methods for teaching statistics at various levels (Becker, 1998; Cobb & Moore, 1997; and Pereira-Mendoza & Schulz, 1997).

These approaches might be somewhat generally categorized as content/conceptual, use of manipulatives, or use of computer software.

The content/conceptual approaches involve the content included in a statistics course or the way that the content might be presented. For example, Anderson-Cook (1998) recommended using the design of an experiment, Albert (1997) suggested focusing on data analysis, and Berry (1997), on science applications. Rumsey (1999) recommended the use of cooperative teaching; Schand (1999), game-playing; and Friedman, Halpern, and Salb (1999), humorous anecdotes. Loftsgaarden and Watkins (1998) found in a survey of two-year colleges that among the more common resources used were projects and reports. Schau and Mattern (1997) illustrated the use of conceptual maps to link statistical concepts. Holcomb and Ruffer (2000) recommended "repeatedly applying an array of techniques to the same dataset [to allow students to] gain a more realistic data analysis experience."

For manipulatives, Loosen (1997) described a device that can be used as a teaching aid for hypothesis testing. The "demonstrator" consists of a wooden frame and wooden representations of sampling distributions with vertical rods to indicate measures of central tendency. The computer software category includes recommendations for software like ActivStats (Harrington, 1999) a CD-ROM package which includes video clips, interactive tools, simulations, exercises, and self-test quizzes; DataDesk (Fridlund, 1997) for interactive data exploration; distribution-fitting software (Madgett, 1998); use of the Chance Database (Garfield, 1997) for teaching resources; and computer simulations (Goel, Peruggia, and An, 1997).

The use of software for teaching statistics is a growing area. Whereas only a few years ago it was difficult to locate any references related to teaching statistics using computers, now it is not at all difficult. What does seem to be limited, however, is using the electronic mail capability of computers for

teaching statistics. It was the purpose of the study, then, to compare electronic mail and a more traditional approach for teaching graduate introductory statistics classes, as well as a combination of the two methods. The electronic courses were first offered in the Fall of 1997 with the Fall, 2000, semester being the most recently included (The Fall, 2000, course syllabus is appended.).

Using a quasi-experimental design, the students were allowed to select the delivery type they wanted. All options were available through the same instructor. There were 20 participants in the electronic classes, 41 in the traditional classes, and 28 in both groups, with a diversity of graduate education students, a majority of whom were white females. The students who preferred the e-mail approach were of two types, either somewhat knowledgeable about the use of computers and modems, or anxious to avoid having to commute or coming to campus and having to find a parking place. The former group was helped with any difficulties they experienced in communicating this way. Passwords were provided free, as part of student fees, by the academic computing center for students who did not already have their own accounts or who preferred to use a student account. Very few students use the campus accounts. The ones who do tend to be employees of the university. Multiple-choice pretests and posttests were given, developed from standardized tests to insure that there would be variance in the test scores.

An analysis of covariance (ANCOVA) was run using posttest scores as the response variable and pretest scores as the covariate. Since the ANCOVA technique involves features of both the analysis of variance and regression, assumptions for both were tested using the NCSS 2000 statistical program (Hintze, 2000). The assumption of random selection was not possible since participation in the electronic mail version of the course was optional. However, there was no obvious demographic difference in the students who chose to take the course electronically and those who opted for the traditional approach, or the combination. Normality

and homoscedasticity across all groups were verified using the Omnibus Normality of Residuals and Modified-Levene Equal-Variance tests. Homogeneity of regression slopes was observed in scatterplots of pretest scores versus posttest scores and their trend lines, by treatment and control groups. Therefore, the assumptions required for ANCOVA seemed to be reasonably well met.

The test indicated that the null hypothesis of no statistically significant difference among the traditional (adjusted mean of 6.17, n=41), electronic (adjusted mean of 6.83, n=20), and both traditional and electronic (adjusted mean of 6.94, n=28) classes' scores could not be rejected at the 0.05 level [$F(2,85)=1.15$, $p=0.32$]. The effect size of the difference in the adjusted means is $f = 0.16$, described by Cohen (1988) as a small effect. It is concluded, then, that offering the course using a traditional approach, electronic mail, or a combination of approaches, seemed to neither help nor hinder the performance of the students, to the extent measured by the multiple-choice tests.

Without a doubt, as Ellram and Easton (1999) noted, the demand for distance learning is increasing. Moreover, "[a]lthough Internet classes require considerable time to develop and implement, the popularity and accessibility" of on line education is making it "an acceptable alternative to traditional classroom settings."

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Analysis of Covariance Report

Response Posttestx

Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Email1No0Both2x	2	Yes	S(A)	S+sA
S(A)	85	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

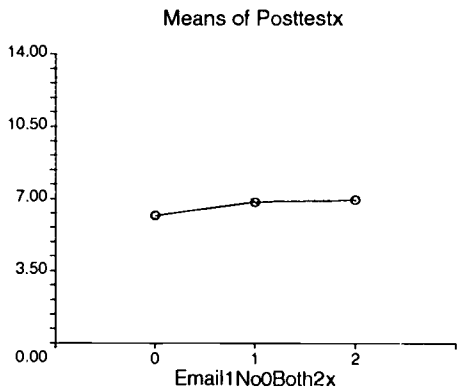
Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
X(Pretestx)	1	12.57719	12.57719	2.45	0.121165	0.340368
A: Email1No0Both2x	2	11.78943	5.894715	1.15	0.321907	0.246411
S	85	436.1733	5.131451			
Total (Adjusted)	88	461.9101				
Total	89					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term	Count	Mean	Standard Error
All	89	6.648089	
A: Email1No0Both2x			
0	41	6.170111	0.3537758
1	20	6.831369	0.5065299
2	28	6.942789	0.4280959

Plots Section



UNIVERSITY OF ARKANSAS AT LITTLE ROCK
College of Education
Department of Educational Leadership
(revised 8/26/00)

I.	Course Prefix and Number	EDFN 7304
II.	Course Title	Basic Statistical Concepts
III.	Credit	3 hours
IV.	Semester and Year	Fall, 2000
V.	Instructor	Rob Kennedy, Ph.D., Professor of Educational Foundations and Higher Education
VI.	Office Location	Dickinson 410
VII.	Office Hours	By appointment
VIII.	Telephone	501-xxx-xxxx (UALR), 501-xxx-xxxx (home), rlkennedy@ualr.edu (E-mail)

IX. Course Description

Techniques used in collecting data; graphic presentation of data; logic of inferential testing; t-test and ANOVA; correlation and regression; selected nonparametric procedures.

X. Course Objectives

Given a research problem and data, select an appropriate statistical analysis, conduct the analysis, and interpret the findings.

XI. Texts, Readings, and Instructional Resources

Required Text

Statter, T. M. (2000). Stat Lite. Unpublished.

XII. Assignments, Evaluation Procedures, and Grading Policy

Course Requirements
Mid-term exam (25%)
Participation (25%)
Final exam (50%)

Evaluation Techniques/Concepts Used for Grading

Grading scale:

A: 90-100
B: 80-89
C: 70-79
D: 60-69
F: 0-59

Mid-term Exam (25%)

The mid-term exam will be hands-on and will consist of problems similar to the homework and/or classroom exercises and will be open book and open notes. The content will include the material covered up to the time of the exam. You will be given a problem statement and data and will be expected to "take it from there". You will need to determine the technique(s) needed to address the problem statement, enter the data, run the stats, interpret the results, and report your findings.

Participation (25%)

Please evaluate each chapter in the text. Evaluation forms are included in the book. You can use the same basic form for each chapter.

You will be given one or more exercises to do in class for practice as part of your participation. You will explain and interpret your findings for these exercises.

Final Exam (50%)

The final exam will be hands-on and will be similar in format to the mid-term as well as open book and open notes. The content will also include material covered up to the time of the exam. Again, you will be given a problem statement and data and will be expected to "take it from there". You will need to determine the technique(s) needed to address the problem statement, enter the data, run the stats, interpret the results, and report your findings.

XIII. Class Policies

Students who demonstrate dedication to the course through attendance, participation, reading, studying, and otherwise applying themselves to the course will benefit in direct proportion to that effort. In other words, "You get out of it what you put into it." This statement may be a cliche', but the sentiment is not. Practicing with the problems and applications is necessary for developing your skill with, and understanding of, statistics.

Just as playing a piano requires much practice to hone ability and interpretation, so does the skill of statistics. If you want to know how and why statistics works, then you need to dig into the subject. Create your own problems and see what happens when various numbers are used or entered. Merely doing the assignments will enable you to get through the course, but true understanding will always require greater commitment. As an advanced student of education, you have to decide if you want to add to your credentials the word "leader".

Additionally, note that because the lab in which we will be working contains a large amount of very expensive equipment, please do not bring in food or drink. If you need to eat during class time, then you are welcome to visit the break lounge near the elevators. If you must be available for communication, please set your cellular phone, pager, beeper, or other device on vibrate so that it does not annoy or distract the other students in the class should it activate. If you do need to take the call, please step out into the hallway to converse.

XIV. Class Schedule

August 30 Introduction, pretests, overview, picture
Homework: Read Chapters 1-3, work the exercises, evaluate the chapters.

Sept. 6 Chapters 1-3: Descriptives
Homework: Read Chapters 1-3, work the exercises, evaluate the chapters.

Sept. 13 Chapters 1-3: Descriptives
Homework: Read Chapters 4-6, work the exercises, evaluate the chapters.

Sept. 20 Chapters 4-6: Correlation
Homework: Read Chapters 4-6, work the exercises, evaluate the chapters.

Sept. 27 Chapters 4-6: Correlation
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 4 Chapters 7-9: Regression
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 11 Chapters 7-9: Regression
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 18 Chapters 7-9: Regression
Homework: Read Chapters 10-12, work the exercises, evaluate the chapters.

October 25 Mid-term exam over Chapters 1-15, evaluation. Turn in chapter evaluation forms if you have not already done so. Review Chapters 1-9.

Nov. 1 Chapters 10-12: T-test
Homework: Read Chapters 10-12, work the exercises, evaluate the chapters.

Nov. 8	Chapters 10-12: T-test Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Nov. 15	Mid-South Educational Research Association. No class. Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Nov. 22	Thanksgiving Holiday. Enjoy!
Nov. 29	Chapters 13-15: Analysis of variance Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Dec. 6	Chapters 13-15: Analysis of variance Homework: Prepare for comprehensive final.
Dec. 18	6:00 pm - 8:00 pm. Final Exam over Chapters 1-15, posttests, and evaluations. Turn in chapter evaluation forms if you have not already done so.

SPECIAL NOTE ABOUT INDIVIDUAL DIFFERENCES

To insure that we are all aware of individual differences, I wish to cite here from the NCATE accreditation manual:

Cultural Diversity: Cultural diversity refers to the cultural backgrounds of students and school personnel, including their ethnicity, race, religion, class, and sex.

Exceptional Populations: Exceptional populations are comprised of students who possess physical, mental, or emotional exceptionalities which may necessitate special attention by school personnel.

Global Perspective: A global perspective is the recognition of the interdependence of nations and peoples and the interlinking political, economic, and social problems of a transnational and global character.

Multicultural Perspective: A multicultural perspective is a recognition of (1) the social, political, and economic realities that individuals experience in culturally diverse and complex human encounters and (2) the importance of culture, race, sex and gender, ethnicity, religion, socioeconomic status, and exceptionalities in the education process.

The requirements for this class are flexible and designed to accommodate individual differences. All students are evaluated relative to the criteria presented within this syllabus, not relative to other persons. There are no restrictions on the number of A's, B's, or other grades to be awarded. All students who meet the requirements for the class will receive the appropriate grade, regardless of any of the above-noted individual differences.

Source of the above definitions: National Council for Accreditation of Teacher Education. (1990). NCATE standards, procedures, and policies for the accreditation of professional education units. Washington, D.C.: Author, 62-65.

Disabled Student Services

It is the policy of UALR to accommodate students with disabilities, pursuant to federal and state law. Any student with a disability who needs accommodation, for example, in seating, placement, or in arrangements for examinations, should inform the instructor at the beginning of the course. The chair of the department offering this course is also available to assist with accommodations. Students with disabilities are also encouraged to contact the Office of Disability Support Services, which is located in the Donaghey Student Center, Room 103, telephone 569-3143.

Source of the above information: UALR Graduate Bulletin.

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These approaches might be somewhat generally categorized as content/conceptual, use of manipulatives, or use of computer software.

The content/conceptual approaches involve the content included in a statistics course or the way that the content might be presented. For example, Anderson-Cook (1998) recommended using the design of an experiment, Albert (1997) suggested focusing on data analysis, and Berry (1997), on science applications. Rumsey (1999) recommended the use of cooperative teaching; Schand (1999), game-playing; and Friedman, Halpern, and Salb (1999), humorous anecdotes. Loftsgaarden and Watkins (1998) found in a survey of two-year colleges that among the more common resources used were projects and reports. Schau and Mattern (1997) illustrated the use of conceptual maps to link statistical concepts. Holcomb and Ruffer (2000) recommended "repeatedly applying an array of techniques to the same dataset [to allow students to] gain a more realistic data analysis experience."

For manipulatives, Loosen (1997) described a device that can be used as a teaching aid for hypothesis testing. The "demonstrator" consists of a wooden frame and wooden representations of sampling distributions with vertical rods to indicate measures of central tendency. The computer software category includes recommendations for software like ActivStats (Harrington, 1999) a CD-ROM package which includes video clips, interactive tools, simulations, exercises, and self-test quizzes; DataDesk (Fridlund, 1997) for interactive data exploration; distribution-fitting software (Madgett, 1998); use of the Chance Database (Garfield, 1997) for teaching resources; and computer simulations (Goel, Peruggia, and An, 1997).

The use of software for teaching statistics is a growing area. Whereas only a few years ago it was difficult to locate any references related to teaching statistics using computers, now it is not at all difficult. What does seem to be limited, however, is using the electronic mail capability of computers for

teaching statistics. It was the purpose of the study, then, to compare electronic mail and a more traditional approach for teaching graduate introductory statistics classes, as well as a combination of the two methods. The electronic courses were first offered in the Fall of 1997 with the Fall, 2000, semester being the most recently included (The Fall, 2000, course syllabus is appended.).

Using a quasi-experimental design, the students were allowed to select the delivery type they wanted. All options were available through the same instructor. There were 20 participants in the electronic classes, 41 in the traditional classes, and 28 in both groups, with a diversity of graduate education students, a majority of whom were white females. The students who preferred the e-mail approach were of two types, either somewhat knowledgeable about the use of computers and modems, or anxious to avoid having to commute or coming to campus and having to find a parking place. The former group was helped with any difficulties they experienced in communicating this way. Passwords were provided free, as part of student fees, by the academic computing center for students who did not already have their own accounts or who preferred to use a student account. Very few students use the campus accounts. The ones who do tend to be employees of the university. Multiple-choice pretests and posttests were given, developed from standardized tests to insure that there would be variance in the test scores.

An analysis of covariance (ANCOVA) was run using posttest scores as the response variable and pretest scores as the covariate. Since the ANCOVA technique involves features of both the analysis of variance and regression, assumptions for both were tested using the NCSS 2000 statistical program (Hintze, 2000). The assumption of random selection was not possible since participation in the electronic mail version of the course was optional. However, there was no obvious demographic difference in the students who chose to take the course electronically and those who opted for the traditional approach, or the combination. Normality

and homoscedasticity across all groups were verified using the Omnibus Normality of Residuals and Modified-Levene Equal-Variance tests. Homogeneity of regression slopes was observed in scatterplots of pretest scores versus posttest scores and their trend lines, by treatment and control groups. Therefore, the assumptions required for ANCOVA seemed to be reasonably well met.

The test indicated that the null hypothesis of no statistically significant difference among the traditional (adjusted mean of 6.17, n=41), electronic (adjusted mean of 6.83, n=20), and both traditional and electronic (adjusted mean of 6.94, n=28) classes' scores could not be rejected at the 0.05 level [$F(2,85)=1.15$, $p=0.32$]. The effect size of the difference in the adjusted means is $f = 0.16$, described by Cohen (1988) as a small effect. It is concluded, then, that offering the course using a traditional approach, electronic mail, or a combination of approaches, seemed to neither help nor hinder the performance of the students, to the extent measured by the multiple-choice tests.

Without a doubt, as Ellram and Easton (1999) noted, the demand for distance learning is increasing. Moreover, "[a]lthough Internet classes require considerable time to develop and implement, the popularity and accessibility" of on line education is making it "an acceptable alternative to traditional classroom settings."

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Analysis of Covariance Report

Response Posttestx

Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A: Email1No0Both2x	2	Yes	S(A)	S+sA
S(A)	85	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

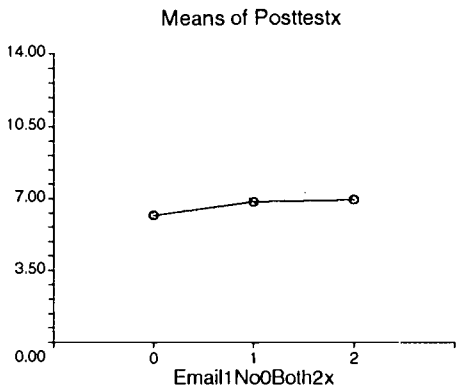
Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
X(Pretestx)	1	12.57719	12.57719	2.45	0.121165	0.340368
A: Email1No0Both2x	2	11.78943	5.894715	1.15	0.321907	0.246411
S	85	436.1733	5.131451			
Total (Adjusted)	88	461.9101				
Total	89					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term	Count	Mean	Standard Error
All	89	6.648089	
A: Email1No0Both2x			
0	41	6.170111	0.3537758
1	20	6.831369	0.5065299
2	28	6.942789	0.4280959

Plots Section



UNIVERSITY OF ARKANSAS AT LITTLE ROCK
College of Education
Department of Educational Leadership
(revised 8/26/00)

I.	Course Prefix and Number	EDFN 7304
II.	Course Title	Basic Statistical Concepts
III.	Credit	3 hours
IV.	Semester and Year	Fall, 2000
V.	Instructor	Rob Kennedy, Ph.D., Professor of Educational Foundations and Higher Education
VI.	Office Location	Dickinson 410
VII.	Office Hours	By appointment
VIII.	Telephone	501-xxx-xxxx (UALR), 501-xxx-xxxx (home), rlkennedy@ualr.edu (E-mail)

IX. Course Description

Techniques used in collecting data; graphic presentation of data; logic of inferential testing; t-test and ANOVA; correlation and regression; selected nonparametric procedures.

X. Course Objectives

Given a research problem and data, select an appropriate statistical analysis, conduct the analysis, and interpret the findings.

XI. Texts, Readings, and Instructional Resources

Required Text

Statter, T. M. (2000). Stat Lite. Unpublished.

XII. Assignments, Evaluation Procedures, and Grading Policy

Course Requirements
Mid-term exam (25%)
Participation (25%)
Final exam (50%)

Evaluation Techniques/Concepts Used for Grading

Grading scale:

A: 90-100
B: 80-89
C: 70-79
D: 60-69
F: 0-59

Mid-term Exam (25%)

The mid-term exam will be hands-on and will consist of problems similar to the homework and/or classroom exercises and will be open book and open notes. The content will include the material covered up to the time of the exam. You will be given a problem statement and data and will be expected to "take it from there". You will need to determine the technique(s) needed to address the problem statement, enter the data, run the stats, interpret the results, and report your findings.

Participation (25%)

Please evaluate each chapter in the text. Evaluation forms are included in the book. You can use the same basic form for each chapter.

You will be given one or more exercises to do in class for practice as part of your participation. You will explain and interpret your findings for these exercises.

Final Exam (50%)

The final exam will be hands-on and will be similar in format to the mid-term as well as open book and open notes. The content will also include material covered up to the time of the exam. Again, you will be given a problem statement and data and will be expected to "take it from there". You will need to determine the technique(s) needed to address the problem statement, enter the data, run the stats, interpret the results, and report your findings.

XIII. Class Policies

Students who demonstrate dedication to the course through attendance, participation, reading, studying, and otherwise applying themselves to the course will benefit in direct proportion to that effort. In other words, "You get out of it what you put into it." This statement may be a cliche', but the sentiment is not. Practicing with the problems and applications is necessary for developing your skill with, and understanding of, statistics.

Just as playing a piano requires much practice to hone ability and interpretation, so does the skill of statistics. If you want to know how and why statistics works, then you need to dig into the subject. Create your own problems and see what happens when various numbers are used or entered. Merely doing the assignments will enable you to get through the course, but true understanding will always require greater commitment. As an advanced student of education, you have to decide if you want to add to your credentials the word "leader".

Additionally, note that because the lab in which we will be working contains a large amount of very expensive equipment, please do not bring in food or drink. If you need to eat during class time, then you are welcome to visit the break lounge near the elevators. If you must be available for communication, please set your cellular phone, pager, beeper, or other device on vibrate so that it does not annoy or distract the other students in the class should it activate. If you do need to take the call, please step out into the hallway to converse.

XIV. Class Schedule

August 30 Introduction, pretests, overview, picture
Homework: Read Chapters 1-3, work the exercises, evaluate the chapters.

Sept. 6 Chapters 1-3: Descriptives
Homework: Read Chapters 1-3, work the exercises, evaluate the chapters.

Sept. 13 Chapters 1-3: Descriptives
Homework: Read Chapters 4-6, work the exercises, evaluate the chapters.

Sept. 20 Chapters 4-6: Correlation
Homework: Read Chapters 4-6, work the exercises, evaluate the chapters.

Sept. 27 Chapters 4-6: Correlation
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 4 Chapters 7-9: Regression
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 11 Chapters 7-9: Regression
Homework: Read Chapters 7-9, work the exercises, evaluate the chapters.

October 18 Chapters 7-9: Regression
Homework: Read Chapters 10-12, work the exercises, evaluate the chapters.

October 25 Mid-term exam over Chapters 1-15, evaluation. Turn in chapter evaluation forms if you have not already done so. Review Chapters 1-9.

Nov. 1 Chapters 10-12: T-test
Homework: Read Chapters 10-12, work the exercises, evaluate the chapters.

Nov. 8	Chapters 10-12: T-test Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Nov. 15	Mid-South Educational Research Association. No class. Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Nov. 22	Thanksgiving Holiday. Enjoy!
Nov. 29	Chapters 13-15: Analysis of variance Homework: Read Chapters 13-15, work the exercises, evaluate the chapters.
Dec. 6	Chapters 13-15: Analysis of variance Homework: Prepare for comprehensive final.
Dec. 18	6:00 pm - 8:00 pm. Final Exam over Chapters 1-15, posttests, and evaluations. Turn in chapter evaluation forms if you have not already done so.

SPECIAL NOTE ABOUT INDIVIDUAL DIFFERENCES

To insure that we are all aware of individual differences, I wish to cite here from the NCATE accreditation manual:

Cultural Diversity: Cultural diversity refers to the cultural backgrounds of students and school personnel, including their ethnicity, race, religion, class, and sex.

Exceptional Populations: Exceptional populations are comprised of students who possess physical, mental, or emotional exceptionalities which may necessitate special attention by school personnel.

Global Perspective: A global perspective is the recognition of the interdependence of nations and peoples and the interlinking political, economic, and social problems of a transnational and global character.

Multicultural Perspective: A multicultural perspective is a recognition of (1) the social, political, and economic realities that individuals experience in culturally diverse and complex human encounters and (2) the importance of culture, race, sex and gender, ethnicity, religion, socioeconomic status, and exceptionalities in the education process.

The requirements for this class are flexible and designed to accommodate individual differences. All students are evaluated relative to the criteria presented within this syllabus, not relative to other persons. There are no restrictions on the number of A's, B's, or other grades to be awarded. All students who meet the requirements for the class will receive the appropriate grade, regardless of any of the above-noted individual differences.

Source of the above definitions: National Council for Accreditation of Teacher Education. (1990). NCATE standards, procedures, and policies for the accreditation of professional education units. Washington, D.C.: Author, 62-65.

Disabled Student Services

It is the policy of UALR to accommodate students with disabilities, pursuant to federal and state law. Any student with a disability who needs accommodation, for example, in seating, placement, or in arrangements for examinations, should inform the instructor at the beginning of the course. The chair of the department offering this course is also available to assist with accommodations. Students with disabilities are also encouraged to contact the Office of Disability Support Services, which is located in the Donaghey Student Center, Room 103, telephone 569-3143.

Source of the above information: UALR Graduate Bulletin.

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